

Amendments to the Drawings:

In Fig. 11, at the lower right of the drawing, delete the reference numeral "54" and insert in place thereof the reference numeral - -56- - to designate the wire bond that is connected to the light source 46.

Enclosed herewith is a sheet containing Fig. 11, with the amendments to the drawing indicated in red ink. Also enclosed is a replacement sheet, incorporating the change. No new matter has been added. Applicants respectfully request entry of the amendment and acceptance of the replacement sheet.

REMARKS

Claims 1, 5, 9-11 and 17-24 remain in this application. Claims 1, 5 and 21 have been amended. Claims 2-4 and 6-8 have been cancelled. Claims 1, 17 and 21 are independent claims.

In the Office action dated February 16, 2006, it was noted that the non-elected claims 12-16 were cancelled.

A. Objection to Fig. 11

Fig. 11 was objected to as failing to comply with 37 CFR 1.84(p)(4), because the reference numeral "54" was used to designate both the wire bond of the sensor die (44) and the wire bond of the light source (46). In response, Applicants include herewith a proposed amendment to Fig. 11. The amended drawing uses the reference numeral "56" to designate the wire bond that is connected to the light source (46). This is consistent with the use of the reference numerals as shown in Fig. 10. Therefore, no new matter has been added. In accordance with the requirement set forth in the Office action, the proposed drawing sheet is labeled in the top margin as a "Replacement Sheet." Applicants respectfully request that the replacement sheet be entered.

B. Claim Objections

In the Office action, claims 6 and 7 were objected to because of an inconsistency in claim language. For an unrelated reason, claims 6 and 7 have been cancelled. As a consequence, the inconsistency in claim language is no longer an issue.

In view of the cancellation of claims 6 and 7, Applicants submit that the pending claims satisfy all claim formality requirements.

C. Allowable Subject Matter

Applicants note with appreciation that claims 17-20 were allowed. Moreover, claims 4 and 5 were merely objected to as being dependent upon a rejected base claim. As will be explained more fully below, Applicants have amended independent claim 1 to include the allowable subject matter of claim 4 and intervening claims 2 and 3.

D. Rejections Based Upon Prior Art

Claims 1-3, 6-8, 21 and 23 were rejected under 35 U.S.C. 102(b) as being anticipated by Nakamura et al. (JP 360035244 A). In addition, claims 9-11, 22 and 24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. in view of Yang et al. (US 2003/0112220 A1). In response, Applicants have amended independent claims 1 and 21 to more clearly distinguish the claimed invention from the cited prior art. Reconsideration is requested.

1. Patentability of Amended Independent Claim 1 and Its Dependent Claims

As noted above, the Office action deemed that claim 9 contained patentable subject matter when combined with the features of rejected base claim 1 and intervening claims 2 and 3. In response, claim 1 has been amended to incorporate the features of claims 2, 3 and 4. Based upon the indication of allowable subject matter, Applicants submit that claim 1 and its dependent claims are in an allowable condition.

Dependent claim 5 has been amended to change its dependency from cancelled claim 4 to amended claim 1. Claims 6-8 have been cancelled because they included subject matter that was either redundant to or contradictory of subject matter described in amended claim 1.

Applicants request reconsideration of the patentability of claim 1.

2. Patentability of Amended Independent Claim 21 and Its Dependent Claims

Claims 21 and 23 were rejected under 35 U.S.C. 102(b) as being anticipated by Nakamura et al., while claims 22 and 24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. in view of Yang et al.

In response to the rejections, independent claim 21 has been amended to patentably distinguish the claimed invention from the cited prior art. Claim 21 describes a method of forming an integrated circuit package. The method includes forming a multi-portion package body of electrically conductive material on a lead frame. The package body includes first and

second portions with structural features that define a locking mechanism for securing the two portions such that first and second areas of the lead frame are at a selected angle with respect to each other. After a sensor die is fixed to the first area and a light source is fixed to the second area, the locking mechanism is engaged to secure the first portion to the second portion, wherein the selected angle is such that a condition is established in which light from the light source illuminates a field of view of the sensor die.

Support for the amendment may be found in Fig. 14 and its related text. Figs. 8 and 10 also show the locking mechanism, but less clearly. In the embodiment of Fig. 14, the locking mechanism is shown as a hook-shaped extension (106) from a first portion (102) of a package body, with the hook-shaped extension being configured to fit within an opening of the second portion (104). As further supported by the application as originally filed, other locking mechanisms may be provided which would fit within the scope of amended claim 21.

Neither Nakamura et al. nor Yang et al. anticipates the method described in amended claim 21. Moreover, neither reference teaches or suggests the use of a locking mechanism, whether the references are taken alone or in combination.

Nakamura et al. describes a lead frame (11) to which a light-emitting element (12) and a light-receiving element (13) are connected. These two elements are molded with light-transmitting synthetic resin (14). After the two elements have been molded onto the lead frame, the individual lead terminals are bent, so that the axes (17 and 17') of the elements cross at a specific distance. Thereafter, an opaque synthetic resin (18) is molded as a unitary body, with the top parts (15a and 16a) being left intact and exposed. Finally, the lead terminals are cut from the lead frame.

In each of the embodiments of Nakamura et al., it is the bending of the individual leads that determines the angle of the light-emitting element to the light-receiving element. The “package body portions” of Nakamura et al. do not include a locking mechanism that secures this angle. Rather, the patent teaches that an opaque synthetic resin (18) is formed as a unitary body. This unitary body secures the angle of the two elements.

Since Nakamura et al. does not teach a locking mechanism as set forth in the claims, the reference does not anticipate amended claim 21, as defined in Section 102(b). Equally importantly, there is no suggestion to a person of ordinary skill in the art to include a locking mechanism. Nakamura

et al. describes fixing the angle by introducing another “body” which substantially encases the two portions of the original “body.” That is, rather than a “cooperative arrangement” of the portions of the package body as set forth in claim 1, Nakamura et al. describes “space filling.”

For example, in Figs. 3B and 3C, the “space filling” of Nakamura et al. is provided by the resin (18) that is formed after the light-emitting element (12) and the light-receiving element (13) have been molded into position by a transparent synthetic resin (14). Because the resin (18) abuts multiple sides of the transparent resin, the components are unable to move. This “space filling” of Nakamura et al. does not anticipate, teach or suggest a package body that includes first and second portions with structural features that define a locking mechanism for selectively securing the first portion to the second portion. Nor does Nakamura et al. anticipate, teach or suggest engaging the locking mechanism to secure the first portion to the second portion after the sensor die and the light source have been fixed to the first and second areas of the lead frame. The various resins of Nakamura et al. do not enable selective securing.

Yang et al. was not cited for teaching a locking mechanism. Rather, Yang et al. was cited because Nakamura et al. fails to disclose providing a sensor die having a matrix of pixel elements and digital signal processing circuitry dedicated to determining navigation information. The Yang et al. device is a pen-type optical mouse. Fig. 4 shows one embodiment of the Yang et al. device. The device includes a main body (10) having an illumination unit (11) and an image sensor (14). In forming the device, the illumination unit and the image sensor are not formed on separate areas of a lead frame. More importantly, in the same manner as Nakamura et al., there is no teaching or suggestion of first and second portions of a package body having structural features that define a locking mechanism for selectively securing the first portion to the second portion such that areas of a lead frame are at a selected angle that establishes a condition in which light from a light source illuminates a field of view of a sensor die. Since neither prior art reference teaches or suggests the use of a locking mechanism as set forth in the pending claims, Applicants submit that amended independent claim 21 is patentably distinguishable over the prior art.

Applicants respectfully request reconsideration of the claims in view of the amendments and remarks made herein. A notice of allowance is

earnestly solicited. In the case that any issues regarding this application can be resolved expeditiously via a telephone conversation, Applicants invite the Examiner to call Terry McHugh at (650) 969-8458.

Respectfully submitted,

By


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Application No. 10/784,487; Inventors: Vince C. Moyer et al.
INTEGRATED CIRCUIT PACKAGE PROVIDED WITH
COOPERATIVELY ARRANGED ILLUMINATION AND SENSING CAPABILITIES
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MARK-UP SHEET

10040097-1 4/7

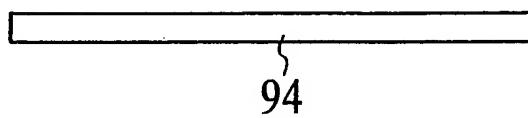


FIG. 6

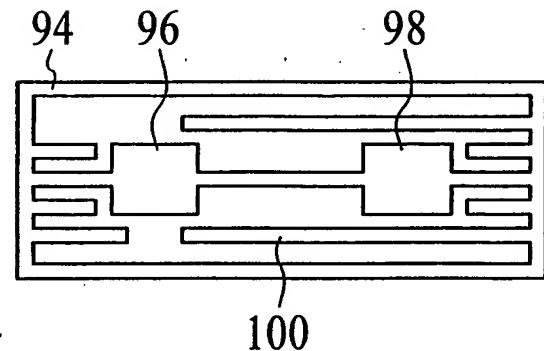


FIG. 7

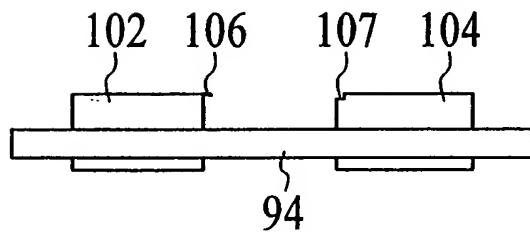


FIG. 8

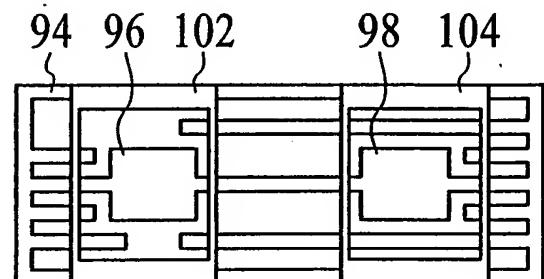


FIG. 9

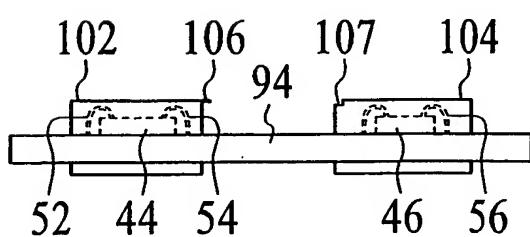


FIG. 10

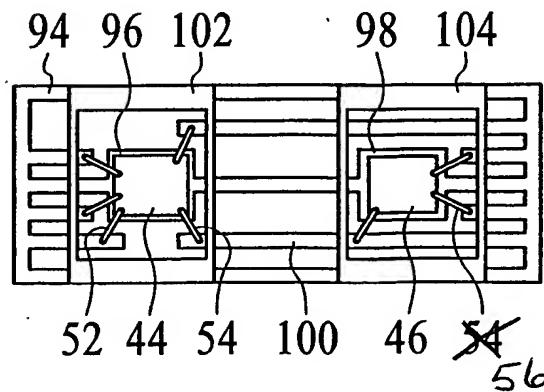


FIG. 11